

## Things to Know, Understand and Do For Chapters 8 and 9: Bonding, Molecular Structure, Hybridization

*By the end of Chapters 8 and 9, you should*

<b>Know how to...</b>
Predict if compound is ionic or covalent only using periodic trends of electronegativities as outlined on the periodic table.
Predict relative strengths of ionic bonds using the ideas of Lattice Energy and Coulomb's Law.
Draw Lewis Structure for small molecules and ions.
Determine the number of $\sigma$ -bonds and $\pi$ -bonds and lone electron pairs around any atom in a Lewis Structure.
Use electronegativity trends (outlined on periodic table) to determine if bond is polar-covalent, non-polar covalent or ionic. (even or uneven electron sharing)
Predict shape or geometry of molecules and ions using the number of $\sigma$ bonding and lone electron pairs on central atom.
Predict bond angles for any angle on a given molecule or ion.
Use VSEPR (valence shell electron-pair repulsion theory) to explain the molecular geometry and bond angles of molecules or ions.
Use molecular geometry and bond dipoles to predict molecular polarity.
Use bond dissociation energies to calculate $\Delta H$ of reaction.

### Chapter 10: Orbital Hybridization/Valence Bond Theory

Predict the hybridization around any atom after drawing Lewis Structure
Understand how $\sigma$ bonds are formed using hybrid orbitals or s-orbitals of H.
Understand how $\pi$ bonds are formed using unhybridized p-orbitals.
Understand the relationship between hybridized orbitals, bonding and lone electron pairs and molecular geometry in $sp^3$ , $sp^2$ , $sp$ , $dsp^3$ , and $d^2sp^3$ hybridizations.

<b>understand...</b>
The difference(s) between ionic and covalent bonds.
Understand and apply octet rule; recognize exceptions to octet rule: <ul style="list-style-type: none"> <li>• Diminished octet: Be-4 electrons (2 <math>e^-</math> pairs); B-6 electrons (3 <math>e^-</math> pairs)</li> <li>• Expanded octet: Elements in 3<sup>rd</sup> period or higher since they have d-orbitals to use</li> </ul>
When to draw resonance structures <b>and</b> what resonance means.
Why some molecules are non-polar or polar.
Understand, define and predict trends in bond order, bond length and bond dissociation energy.

### Ch 8 + 9 HW

Pg 382 Q 1, 4, 7, 13, 14, 20, 23  
 Pg 383 Q 25, 30, 36, 42, 43 (a-d)  
 Pg 384 Q 47, 54, 55, 57  
 Pg 385 Q 67 (a, c, e, g, i, j), 72, 75  
 Pg 386 Q 84, 89, 92  
 Pg 387 Q 103, 112  
 Pg 389 Q 131  
 Pg 417 Q 5  
 Pg 418 Q 9, 15, 27 (a-d, h, k)

### Student Presentations

**pg 383 Q 31, 41**  
*pg 384 Q 46, 56*  
**pg 385 Q 67 (b, d, f, h), 74**  
*pg 386 Q 83, 93*  
**pg 418 Q 16, 17, 20**